WHAT IS CLAIMED IS:

1. An optical object identification apparatus, comprising:

at least one light emitting-side optical system that includes a light emitting device and an objective lens, and that irradiates light from the light emitting device to a moving target object and forms a light spot on the target object;

at least one light receiving-side optical system that includes a light receiving lens and a light receiving device, and that outputs an output signal having a waveform corresponding to surface projections and depressions of the target object when reflected light from the light spot enters the light receiving device; and

a signal processing section that executes signal processing of the output signal outputted from the light receiving-side optical system.

2. The optical object identification apparatus as claimed in claim 1, wherein

the light emitting device is a semiconductor laser.

3. The optical object identification apparatus as claimed in claim 1, comprising

a pair of the one light emitting-side optical system and the one light receiving-side optical system, wherein

an optical axis of the light emitting-side optical system and an optical axis of the light receiving-side optical system are vertical to a light spot formation face on the target object.

4. The optical object identification apparatus as claimed in claim 1, comprising:

one light emitting-side optical system; and

two light receiving-side optical systems, wherein

an angle between an optical axis of one of the two light receiving-side optical systems and a light spot formation face of the target object is equal to an angle between an optical axis of the light emitting-side optical system and the light spot formation face of the target object.

5. The optical object identification apparatus as claimed in claim 1, wherein

the light emitted from the light emitting device is polarized light whose direction of polarization is vertical or parallel to a plane of incidence.

6. The optical object identification apparatus as claimed in claim 5, wherein the light receiving-side optical system has two light receiving devices, the optical object identification apparatus further comprising:

a beam splitter provided in the light receiving-side optical system for letting the reflected light from the light spot come incident to each of the two light receiving devices; and

polarization means disposed immediately before one of the light receiving devices in the light receiving-side optical system for passing polarized light having a direction of polarization that is orthogonal to the direction of polarization of the light emitted from the light emitting device.

7. The optical object identification apparatus as claimed in claim 5, comprising:

two light receiving regions provided in the light receiving device;

a diffraction grating provided in the light receiving-side optical system and designed such that intensity of zero-order diffraction light is sufficiently smaller than intensity of ± first-order diffraction light; and

polarization means disposed immediately before one of the light receiving regions in the light receiving device for passing polarized light having a direction of polarization that is orthogonal to the direction of polarization of the light emitted from the light emitting device, wherein

the ± first-order diffraction light from the diffraction grating enters the two right receiving regions.

8. The optical object identification apparatus as claimed in claim 5, wherein

the light receiving device in the light receiving-side optical system is disposed in a position closer to the light receiving lens than a location of an image of the light spot formed by the light receiving lens is,

polarization means disposed immediately before a half region of a light receiving face in the light receiving device is provided for passing polarized light having a direction of polarization that is orthogonal to the direction of polarization of the light emitted from the light emitting device, and

an image of the light spot formed on the light receiving face of the light receiving device by the light receiving lens is formed in a boundary between a region of

the light receiving face on which the polarization means is disposed and a region of the light receiving face on which the polarization means is not disposed.

9. The optical object identification apparatus as claimed in claim 6, wherein

the polarization means comprises a polarization device formed on the one light receiving device.

10. The optical object identification apparatus as claimed in claim 7, wherein

the polarization means comprises a polarization device formed on the light receiving region.

11. The optical object identification apparatus as claimed in claim 8, wherein

the polarization means is a polarization device formed on the light receiving device.

12. The optical object identification apparatus as claimed in claim 1, wherein

the signal processing section executes signal processing on a section of specified length of time in the output signal by at least one signal processing method selected from the group consisting of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and the mean amplitude divided by the mean value after passing the output signal through a filter circuit.

13. The optical object identification apparatus as claimed in claim 12, wherein

the signal processing section executes signal processing by at least two of the mean value calculating method, the mean amplitude value calculating method, the mean-amplitude/mean value calculating method, the frequency distribution calculating method, the power spectral area ratio calculating method, and the filter passing method, and calculates a ratio between processing results obtained by these two signal processing methods.

14. The optical object identification apparatus as claimed in claim 4, wherein

the signal processing section executes signal processing on respective output signals from the two light receiving-side optical systems by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and the mean amplitude divided by the mean value after passing the output signal through a filter circuit,

and the signal processing section calculates a ratio between processing results for these two light receiving-side optical systems.

15. The optical object identification apparatus as claimed in claim 6, wherein

the signal processing section executes signal processing on two types of output signals that are respectively based on light that has passed the polarization means and light that has not passed the polarization means, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and the mean amplitude divided by the mean value after passing the output signals through a filter circuit,

and the signal processing section calculates a ratio between processing results of these two types of output signals.

16. The optical object identification apparatus as claimed in claim 7, wherein

the signal processing section executes signal processing on two types of output signals that are respectively based on light that has passed the polarization means and light that has not passed the polarization means, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and

the mean amplitude divided by the mean value after passing the output signals through a filter circuit,

and the signal processing section calculates a ratio between processing results of these two types of output signals.

17. The optical object identification apparatus as claimed in claim 8, wherein

the signal processing section executes signal processing on two types of output signals that are respectively based on light that has passed the polarization means and light that has not passed the polarization means, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and the mean amplitude divided by the mean value after passing the output signals through a filter circuit,

and the signal processing section calculates a ratio between processing results of these two types of output signals.

18. The optical object identification apparatus as claimed in claim 9, wherein

the signal processing section executes signal processing on two types of output signals that are respectively based on light that has passed the polarization means and light that has not passed the polarization means, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and

the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and the mean amplitude divided by the mean value after passing the output signals through a filter circuit,

and the signal processing section calculates a ratio between processing results of these two types of output signals.

19. The optical object identification apparatus as claimed in claim 10, wherein

the signal processing section executes signal processing on two types of output signals that are

respectively based on light that has passed the polarization means and light that has not passed the polarization means, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and the mean amplitude divided by the mean value after passing the output signals through a filter circuit,

and the signal processing section calculates a ratio between processing results of these two types of output signals.

20. The optical object identification apparatus as claimed in claim 11, wherein

the signal processing section executes signal processing on two types of output signals that are respectively based on light that has passed the polarization means and light that has not passed the polarization means, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying

Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and the mean amplitude divided by the mean value after passing the output signals through a filter circuit,

and the signal processing section calculates a ratio between processing results of these two types of output signals.

21. The optical object identification apparatus as claimed in claim 6, comprising

another light receiving-side optical system also having the polarization means, wherein

the signal processing section executes signal processing on two types of output signals that are respectively based on light that has passed the polarization means and light that has not passed the polarization means, for each of the two light receiving-side optical systems, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and

the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and the mean amplitude divided by the mean value after passing the output signals through a filter circuit,

and the signal processing section calculates a ratio between processing results of the output signals of the two light receiving-side optical systems that have passed the polarization means, and a ratio between processing results of the output signals of the two light receiving-side optical systems that have not passed the polarization means.

22. The optical object identification apparatus as claimed in claim 7, comprising

another light receiving-side optical system also having the polarization means, wherein

the signal processing section executes signal processing on two types of output signals that are respectively based on light that has passed the polarization means and light that has not passed the polarization means, for each of the two light receiving-side optical systems, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between

different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and the mean amplitude divided by the mean value after passing the output signals through a filter circuit,

and the signal processing section calculates a ratio between processing results of the output signals of the two light receiving-side optical systems that have passed the polarization means, and a ratio between processing results of the output signals of the two light receiving-side optical systems that have not passed the polarization means.

23. The optical object identification apparatus as claimed in claim 8, comprising

another light receiving-side optical system also having the polarization means, wherein

the signal processing section executes signal processing on two types of output signals that are respectively based on light that has passed the polarization means and light that has not passed the polarization means, for each of the two light receiving-side optical systems, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and the mean amplitude divided by the mean value after passing the output signals through a filter circuit,

and the signal processing section calculates a ratio between processing results of the output signals of the two light receiving-side optical systems that have passed the polarization means, and a ratio between

processing results of the output signals of the two light receiving-side optical systems that have not passed the polarization means.

24. The optical object identification apparatus as claimed in claim 9, comprising

another light receiving-side optical system also having the polarization means, wherein

the signal processing section executes signal processing on two types of output signals that are respectively based on light that has passed the polarization means and light that has not passed the polarization means, for each of the two light receiving-side optical systems, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and the mean amplitude divided by the mean value after passing the output signals through a filter circuit,

and the signal processing section calculates a ratio between processing results of the output signals of the two light receiving-side optical systems that have passed the polarization means, and a ratio between processing results of the output signals of the two light receiving-side optical systems that have not passed the polarization means.

25. The optical object identification apparatus as claimed in claim 10, comprising

another light receiving-side optical system also having the polarization means, wherein

the signal processing section executes signal processing on two types of output signals that are respectively based on light that has passed the polarization means and light that has not passed the polarization means, for each of the two light receiving-side optical systems, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and

the mean amplitude divided by the mean value after passing the output signals through a filter circuit,

and the signal processing section calculates a ratio between processing results of the output signals of the two light receiving-side optical systems that have passed the polarization means, and a ratio between processing results of the output signals of the two light receiving-side optical systems that have not passed the polarization means.

26. The optical object identification apparatus as claimed in claim 11, comprising

another light receiving-side optical system also having the polarization means, wherein

the signal processing section executes signal processing on two types of output signals that are respectively based on light that has passed the polarization means and light that has not passed the polarization means, for each of the two light receiving-side optical systems, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and

the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and the mean amplitude divided by the mean value after passing the output signals through a filter circuit,

and the signal processing section calculates a ratio between processing results of the output signals of the two light receiving-side optical systems that have passed the polarization means, and a ratio between processing results of the output signals of the two light receiving-side optical systems that have not passed the polarization means.

27. The optical object identification apparatus as claimed in claim 1, wherein

the signal processing section executes signal processing on a plurality of different sections in the output signal obtained by movement of the target object, by at least any one of:

a mean value calculating method of calculating a mean value of output values;

a mean amplitude value calculating method of obtaining differences between each of the output values and the mean value and doubling a mean value of absolute values of these differences;

a mean-amplitude/mean value calculating method of calculating the mean amplitude value divided by the mean value;

a frequency distribution calculating method of obtaining frequency distribution of the output values with a maximum value being set to 1;

a power spectral area ratio calculating method of obtaining spectral distribution by applying Fourier transform and obtaining an area ratio between different distribution ranges in the spectral distribution; and

a filter passing method of calculating at least one of the mean value, the mean amplitude value, and

the mean amplitude divided by the mean value after passing the output signal through a filter circuit,

and the signal processing section calculates a mean value of processing results of the plurality of the sections.

28. A printing apparatus incorporating the optical object identification apparatus of claim 1.

29. An object classification apparatus incorporating the optical object identification apparatus of claim 1.